

Appl. No. 09/941,934
Amdt. dated September 3, 2004
Reply to Office action of June 3, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A regenerative energy and/or mass exchange assembly, comprising:

- (a) an exchange media;
- (b) ~~a first flow path to pass a fluid stream through the exchange media~~ a first chamber having a first fluid channel adjacent the exchange media to pass a first fluid stream through the exchange media;
- (c) ~~, at least a second flow path to pass a further fluid stream through the exchange media;~~ at least a second chamber having a second fluid channel adjacent the exchange media to pass a second fluid stream through the exchange media, the first and at least second chambers separated by a divider; and
- (d) ~~at least one fluid stream diverter to divert the different flow paths to pass the respective fluid streams through different regions of the exchange media;~~ at least one fluid stream diverter adjacent the exchange media, the at least one diverter having an adjustable orientation and providing separate flow communications to the chambers through the respective fluid channels, the at least one fluid stream diverter having a radial extent that is less than the functional radial extent of the exchange media, this functional radial extent of the

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exchange media being defined by the fluid conducting area of the
exchange media adjacent the fluid channels;

and wherein, at any given diverter orientation, the separate flow
communications are not in fluid communication with the same chamber.

2. (Currently Amended) An exchange assembly according to claim 1 further comprising at least one housing connected to one end of the exchange media and wherein the ~~flow paths~~ fluid channels are provided in the housing.

3. (Currently Amended) An exchange assembly according to claim 2 wherein the at least one housing has interior walls defining an inner enclosure, and the at least one fluid stream diverter is provided in the housing inner enclosure.

4. (Canceled)

5. (Currently Amended) An exchange assembly according to ~~claim 4~~ claim 3 wherein the fluid stream diverter is rotatably mounted within the ~~housing inner enclosure~~ to provide the diverter with the adjustable orientation.

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Currently Amended) An exchange assembly according to ~~claim 7 or 8~~ claim 5 further comprising a shaft that extends rotatably through the exchange

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media[,] and the at least one housing connected to one end of the exchange media, and wherein the fluid stream diverter rotatably mounted within the housing is fixed to the shaft.

10. (Canceled)

11. (Currently Amended) An exchange assembly according to claim ~~403~~ wherein the at least one housing connected to one end of the exchange media comprises a connection portion and a dispersion portion which are in fluid communication with each other.

12. (Currently Amended) An exchange assembly according to claim 11 wherein the connection portion has at least ~~two~~ one ports in flow communication with each respective fluid channel, each port adapted to connect to external fluid stream sources.

13. (Currently Amended) An exchange assembly according to claim ~~4211~~ wherein the dispersion portion has an open end that is in fluid communication with the exchange media.

14. (Currently Amended) An exchange assembly according to claim ~~4311~~ wherein the connection portion has a radial extent that is ~~generally~~ less than the radial extent of the dispersion portion.

15. (Currently Amended) An exchange assembly according to claim ~~4411~~ wherein the ~~fluid stream diverter~~ inner enclosure is substantially disposed within the connection portion.

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16. (Currently Amended) An exchange assembly according to claim 15 wherein the fluid stream diverter has a radial extent that is substantially equal to the radial extent of ~~an inner wall of the connection portion~~ the inner enclosure.

17. (Currently Amended) An exchange assembly according to claim ~~16~~11 wherein the dispersion portion comprises ~~a plurality of chambers that are separated from one another~~ the first and at least second chambers.

18. (Currently Amended) An exchange assembly according to claim 17 wherein the exchange media is housed in a plurality of media cavities that are separated from one another in cross section and extend in parallel along the exchange media, and wherein the plurality of cavities that house the exchange media are disposed within a central housing.

19. (Original) An exchange assembly according to claim 18 wherein each cavity is thermally insulated from adjacent cavities.

20. (Currently Amended) An exchange assembly according to claim ~~19~~18 wherein the plurality of media cavities ~~that house the exchange media are~~ are positioned in correspondence to the chambers of the dispersion portion.

21. (Currently Amended) An exchange assembly according to claim ~~20~~18 wherein the media cavities and the chambers are substantially equal in cross section and substantially evenly spaced about the axial direction.

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22. (Currently Amended) An exchange assembly according to claim 21, wherein the number of chambers is three, and the number of media cavities is three.

23. (Currently Amended) An exchange assembly as accordingly to claim 21, wherein the number of chambers is five, and the number of media cavities is five.

24. (Currently Amended) An exchange assembly according to claim ~~22~~ 23 ~~18~~, wherein the fluid stream diverter comprises in sequence along the axial direction a first segment, a first reduced diameter portion, a second segment, a second reduced diameter portion, and a third segment; an inner bore defining an inner space within the fluid stream diverter; a first passage extending from a first port in the outer wall of the second reduced diameter portion through the inner space and then to a second port on the outer wall of the first segment; a second passage extending from a third port on the end wall of the first segment adjacent to the first reduced diameter portion to a fourth port on the outer wall of the first segment; and wherein the said first and second passages are isolated from each other.

25. (Original) An exchange assembly according to claim 24 wherein sealing means is provided between the fluid stream diverter and the connection portion.

26. (Currently Amended) An exchange assembly according to claim ~~25~~ 24 wherein sealing means is provided between each of the first, second, and third segments, of the fluid stream diverter and the ~~inner~~ interior wall ~~of~~ defining the inner enclosure of the connection portion.

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27. (Currently Amended) An exchange assembly according to claim ~~26~~18 wherein the connection portion has an open end and a closing means which closes the open end.

28. (Original) An exchange assembly according to claim 18 further comprising snap-connection means provided between the central housing and the housing connected to one end of the exchange media.

29. (Currently Amended) An exchange assembly according to claim ~~29~~18 wherein the assembly has a first end housing and a second end housing disposed on either end of the exchange media.

30. (Original) An exchange assembly according to claim 29 wherein a first fluid stream diverter is disposed in the first end housing and a second fluid stream diverter is disposed within the second end housing.

31. (Original) An exchange assembly according to claim 30 wherein the plurality of chambers of the dispersion portion of the first end housing is in substantial axial alignment with the corresponding plurality of chambers of the dispersion portion of the second end housing.

32. (Original) An exchange assembly according to claim 31 wherein the first and second fluid stream diverters are disposed correspondingly in the respective end housings and rotate in phase during operation.

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33. (Currently Amended) A method of exchanging energy and/or mass between at least two fluid streams, the method comprising:

- (a) ~~passing at least two fluid streams through different regions of an exchange media providing an exchange media;~~
- (b) ~~changing the flow paths of the fluid streams to the exchange media so that at least one of the fluid streams is passed through a region of the exchange media that a different fluid stream had passed through.~~ passing a first fluid stream through a first flow path comprising a first chamber having a first fluid channel, the first fluid channel being in fluid communication with a first region of the exchange media;
- (c) passing at least a second fluid stream through at least a second flow path comprising at least a second chamber having a second fluid channel, the at least second fluid channel being in fluid communication with a second region of the exchange media, and the first and at least second chambers being separated by a divider;
- (d) providing at least one fluid stream diverter adjacent the exchange media, the fluid stream diverter having a radial extent less than the functional radial extent of the exchange media, the functional radial extent of the exchange media being defined by the fluid conducting area of the exchange media adjacent the fluid channels, the fluid stream diverter having an adjustable orientation and providing separate flow communications to the chambers through the respective fluid channels;
- (e) changing the flow paths of the fluid streams to the exchange media by adjusting the orientation of the diverter so that at least one of the fluid streams is passed through one of the exchange media regions

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through which a different fluid stream had passed prior to changing the flow paths;

and wherein at any one of before, after, and during the changing of the flow paths, the separate fluid streams are not in flow communication with the same chamber.

34. (Canceled)

35. (Currently Amended) A method according to claim ~~34~~33 wherein the fluid stream diverter is provided in a housing connected to one end of the exchange media.

36. (Original) A method according to claim 35 wherein the housing and the fluid stream diverter cooperate to form the flow paths.

37. (Original) A method according to claim 36 wherein the fluid stream diverter is rotatably mounted within the housing.

38. (Original) A method according to claim 37 wherein the exchange media is housed in a plurality of cavities that are separated from one another in cross section and extend in parallel along the direction of fluid stream flow.

39. (Currently Amended) A method according to claim ~~37~~38 wherein the fluid stream diverter rotates to pass the different fluid streams through the exchange media.

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40. (Currently Amended) A method according to claim ~~3737~~ 3738 wherein the fluid stream diverter rotates to pass the different fluid streams through different cavities of the exchange media.

41. (Currently Amended) A method according to claim ~~4037~~ wherein in step (a) ~~passing the fluid streams through different regions of an exchange media is in a concurrent direction.~~ (e), the at least one of the fluid streams that is passed through an exchange media region through which a different fluid stream had passed prior to changing the flow paths flows through the region in the same direction as the prior different fluid stream.

42. (Currently Amended) A method according to claim ~~3737~~ 3738 wherein in step (a) ~~passing the fluid streams through different regions of an exchange media is in a counter-current direction.~~ (e), the at least one of the fluid streams that is passed through an exchange media region through which a different fluid stream had passed prior to changing the flow paths flows through the region in the opposite direction as the prior different fluid stream.

43. (New) A regenerative energy and/or mass exchange assembly, comprising:

- (a) an exchange media housed in a plurality of cavities that are separated from one another in cross section and extend in parallel along the direction of fluid stream flow, the plurality of cavities being disposed in a central housing and each cavity being thermally insulated from adjacent cavities;
- (b) a first flow path to pass a fluid stream through the exchange media;

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- (c) at least a second flow path to pass a further fluid stream through the exchange media;
- (d) at least one housing connected to one end of the exchange media, the flow paths being provided in the housing;
- (e) at least one fluid stream diverter that cooperates with the housing to form the flow paths, the at least one diverter having a radial extent that is generally less than the radial extent of the exchange media and being rotatably mounted within the housing to divert the different flow paths to pass the respective fluid streams through different cavities of the exchange media, and
- (f) a shaft that extends through the exchange media, the at least one housing connected to one end of the exchange media, and the fluid stream diverter rotatably mounted within the housing;

and wherein

the at least one housing connected to one end of the exchange media comprises a connection portion and a dispersion portion which are in fluid communication with each other;

the connection portion has at least two ports adapted to connect to external fluid stream sources and a radial extent that is generally less than the radial extent of the dispersion portion, the diverter being substantially disposed within the connection portion and having a radial extent that is substantially equal to the radial extent of an inner wall of the connection portion;

the dispersion portion has an open end that is in fluid communication with the exchange media, the dispersion portion

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comprising a plurality of chambers that are separated from one another;
and

the plurality of cavities that house the exchange media are disposed within a central casing, each cavity being thermally insulated from adjacent cavities and being positioned in correspondence to the chambers of the dispersion portion, the cavities and the chambers being substantially equal in cross-section and substantially evenly spaced about the axial direction, the quantity of cavities and chambers be equal to each other and equal to a quantity of one of the group consisting of three and five, and wherein

the fluid stream diverter comprises in sequence along the axial direction a first segment, a first reduced diameter portion, a second segment, a second reduced diameter portion, and a third segment; an inner bore defining an inner space within the fluid stream diverter; a first passage extending from a first port in the outer wall of the second reduced diameter portion through the inner space and then to a second port on the outer wall of the first segment; a second passage extending from a third port on the end wall of the first segment adjacent to the first reduced diameter portion to a fourth port on the outer wall of the first segment; and wherein the said first and second passages are isolated from each other.

44. (New) An exchange assembly according to claim 43 wherein sealing means is provided between the fluid stream diverter and the connection portion.

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45. (New) An exchange assembly according to claim 44 wherein sealing means is provided between each of the first, second, and third segment, of the fluid stream diverter and the inner wall of the connection portion.

46. (New) An exchange assembly according to claim 45 wherein the connection portion has an open end and a closing means which closes the open end.

47. (New) A regenerative energy and/or mass exchange assembly, comprising:

- (a) an exchange media housed in a plurality of cavities that are separated from one another in cross section and extend in parallel along the direction of fluid stream flow;
- (b) a first flow path to pass a fluid stream through the exchange media;
- (c) at least a second flow path to pass a further fluid stream through the exchange media;
- (d) at least one housing connected to one end of the exchange media, the flow paths being provided in the housing;
- (e) at least one fluid stream diverter that cooperates with the housing to form the flow paths, the at least one diverter having a radial extent that is generally less than the radial extent of the exchange media and being rotatably mounted within the housing to divert the different flow paths to pass the respective fluid streams through different cavities of the exchange media; and

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(f) a shaft that extends through the exchange media, the at least one housing connected to one end of the exchange media, and the fluid stream diverter rotatably mounted within the housing; and wherein

the at least one housing connected to one end of the exchange media comprises a connection portion and a dispersion portion which are in fluid communication with each other;

the connection portion has at least two ports adapted to connect to external fluid stream sources and a radial extent that is generally less than the radial extent of the dispersion portion, the diverter being substantially disposed within the connection portion and having a radial extent that is substantially equal to the radial extent of an inner wall of the connection portion;

the dispersion portion has an open end that is in fluid communication with the exchange media, the dispersion portion comprising a plurality of chambers that are separated from one another;

the plurality of cavities that house the exchange media are disposed within a central housing; and

the assembly further comprising snap-connection means provided between the central housing and the housing connected to one end of the exchange media.

48. (New) A regenerative energy and/or mass exchange assembly, comprising:

(a) an exchange media having a casing;

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(b) at least one housing attached to one end of the casing, the housing having:

- i) a dispersion end with a first and at least a second chamber adjacent the exchange media, the first and at least second chambers separated by a divider; and
- ii) a connection end with first and at least second ports for connection to external fluid flows;

(c) a fluid stream diverter disposed in the housing between the dispersion end and the ports of the connection end, the fluid stream diverter having an adjustable orientation within the housing and cooperating with the housing to form at least two separate movable fluid channels extending between the ports and the chambers; and

(d) sealing means provided between the housing and the fluid stream diverter for preventing fluid cross-flow between the at least two movable fluid channels, the movable fluid channels providing separate flow communications between the ports and the chambers independent of the attachment of the housing to the casing.

49. (New) The exchange assembly of claim 48 wherein the diverter is generally cylindrical in shape and wherein the at least two movable fluid channels comprise respective first and second annular grooves provided in the diverter and separated by an annular wall

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50. (New) The exchange assembly of claim 49 wherein the sealing means comprises an o-ring disposed between the annular wall and an inner surface of the housing.